

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

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COMPETITION FOR SAFETY FUEL TANKS.

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**FILE COPY**

To be returned to  
the files of the Langley  
Memorial Aeronautical  
Laboratory

## COMPETITION FOR SAFETY FUEL TANKS.

The Director of Research, Air Ministry, in aiming at securing the design of a thoroughly safe and reliable fuel tank for service and commercial purposes, is desirous of bringing to notice that it is proposed to hold a competition on the lines laid down and governed by the following rules and regulations:-

### 1. Prizes.

A prize of £1,400 will be awarded to the maker of the tank, which, in the opinion of the Judges, while fulfilling the requirements and possessing the attributes stated below, is best suited for use in aeroplanes and seaplanes.

No guarantee is given that contracts for the successful type of tank will be placed, and should such orders be given they will not necessarily be confined to the prize winner.

The entrant of the tank, which in the opinion of the judges merits second place, will be awarded a prize of £400.

The entrant of the tank, which in the opinion of the judges merits third place, will be awarded a prize of £200.

### 2. Requirements to be fulfilled.

(a) The tank is to be constructed so as to prevent as far as possible leakage or ignition of fuel:

(i) When subjected to stresses similar to those to which the tank would be subjected in an aircraft crash;

(ii) Subjected to machine gun fire using incendiary, armour-piercing, or explosive ammunition.

Equal importance is attached to the requirements involved in (i) and (ii) above.

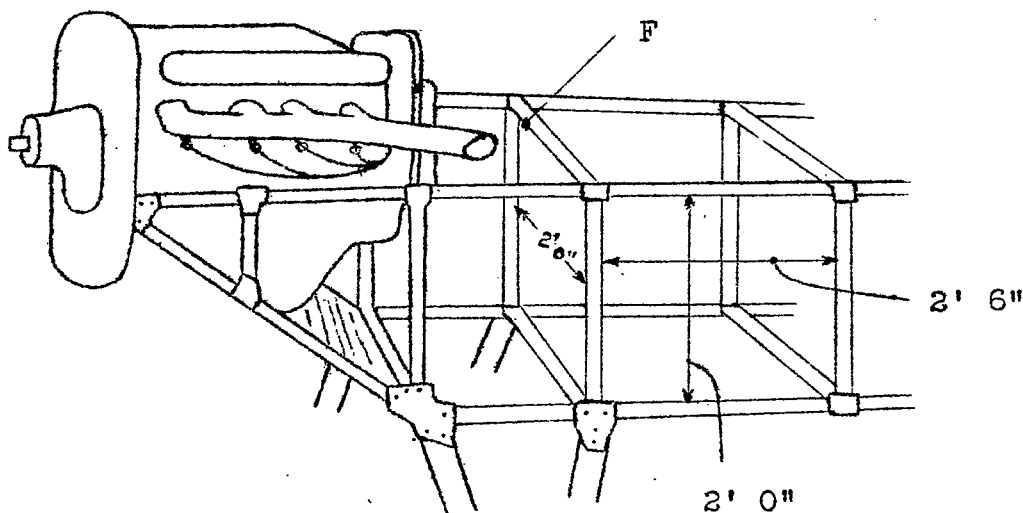
(b) The tank is to be capable of being fitted within a space of 2 ft. 6 in. by 2 ft. by 2 ft. In conforming to this rule any shape of tank will be accepted for competition.

(c) The capacity of the tank must be within 5 per cent. of 30 gals.

(d) All the necessary fittings to enable the tank to be mounted in the structure shown in accompanying diagram must be supplied by the competitor.

(e) 1.75 lb. complete with fittings as mentioned in paragraphs (d) and (f) per gallon capacity is regarded as the maximum weight which would only be justified by very exceptional qualities.

Tanks exceeding this figure will not be disqualified, but



Inside measurements.

it should be borne in mind that great importance will be attached to low weight.

(f) In all cases the tank is to be complete with the necessary fittings to enable it to perform its functions of supplying fuel to the point "F" shown on the diagram.

In the case of tanks designed to incorporate leak detectors and similar instruments and devices, these latter will be fitted in such a manner as to show their efficiency under test, and will be included in the weight. In every case there must be at least one filler and also unions for supply and delivery connections, one of the latter at the top, the other at the bottom of the tank.

### 3. Other Characteristics.

The main requirements to be fulfilled are as detailed in paragraph 2 (a) (i) and (ii) "Requirements to be Fulfilled." The relative importance of other characteristics of the tanks will be considered in the following order:-

1. Light weight.
2. Durability under service conditions in the absence of any accident.\*
3. Indifference to extremes of temperature.
4. Adaptability of design to large capacities.
5. Simplicity of construction.
6. Adaptability of design to various shapes.

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\* It is pointed out that in the case of scout aircraft the stress due to acceleration may amount to three or four times that due to gravity..

7. Accessibility of fittings.

8. Cost of production.

#### 4. Tests.

All tanks will be submitted to preliminary trials. The three best types will be selected by the Judges for the final trial.

##### Preliminary Tests.

For the preliminary tests at least two tanks of exactly similar design will be submitted by each competitor. Both of these will be subjected to a crashing test of the following nature.

The tank will be mounted in a wooden structure conforming in general to the design shown in the diagram, it being mounted behind a concrete body formed to represent an engine. The tank will be released down a wire ropeway, approximately 100 ft. high, so arranged that the structure will strike the ground at an angle of not less than  $45^{\circ}$  from the horizontal and will be free to turn over. This will ensure as far as possible the conditions prevailing in a typical aircraft crash.

In both the above-mentioned tests the tanks will contain 22 gallons of petrol which will be supplied by the Air Ministry.

##### Final Tests.

For the final tests at least four tanks of a type will be supplied by each remaining competitor. Minor modifications of the original design may be made in the tank submitted for final test, provided the Judges have previously decided that the modification

is one of detail and not fundamental principle. The four tanks must be identical. These will be subjected to crashing and firing test, the former as detailed above, and the latter as follows:-

The tank will be subjected to machine gun fire with ammunition capable of:-

(1) Penetrating the ordinary type of mild steel fuel tank, and leaving small entry and large exit holes when the tank is struck below fuel level.

(2) Exploding and igniting the fuel either on contact or after penetration.

A series of bursts of five rounds each will be fired at a range of 50 yards, the tank being examined after each burst.

The angle of fire will be at the discretion of the Judges.

At any time during the competition the Judges may impose such other tests (e.g., to determine the resistance to acceleration, etc.) as they may desire in order to demonstrate the relative merits of competing tanks.

There will be an interval of at least eight weeks between the preliminary and final tests.

#### Regulations.

(1) The competition will begin on December 1, 1931, and will be held at a place hereafter to be notified to intending competitors.

(2) Each tank entered will be supplied at the cost of the competitor, and is to be packed in a strong case or crate suitable for distant transport by rail, and delivered carriage paid to the ap-

pointed place on or before November 23, 1921, the case to be clearly marked "Safety Fuel Tank Competition."

(3) Any communication required to be made in connection with this competition is to be addressed to The Secretary (R.D.I.) Air Ministry, Kingsway, London, W.C. 2, marking all letters "Safety Fuel Tank Competition."

(4) Any competitor may enter several different types of tanks, but two specimens of each type must be supplied by each competitor for the preliminary tests and four for the final tests.

(5) Entries will be received up to and including November 7, 1921.

(6) Entries shall be made in writing on the attached form (a separate form being submitted for each type of tank entered) stating the name and address of the entrant, with particulars of the tank to be submitted, including, if possible, weight and actual capacity; such information will be treated in strict confidence.

(7) The competition may be postponed or any item abandoned at the discretion of the Judges Committee, and in the event of such postponement or abandonment no competitor shall have any claim whatever against the Judges Committee or Air Ministry.

(8) The supreme control of the competition will lie with the Judges Committee who will decide the winning, second and third competitors. Their decision shall be final and without appeal. No decision of the Judges Committee shall give any claim to a competitor who is subsequently shown to have failed to observe these regulations.

(9) The Judges shall be appointed by the Air Council.

(10) Any information obtained from or reports in connection with this competition shall be considered as secret, and shall not be communicated to the Press or otherwise published without the previous consent in writing of the Director General of Supply and Research.